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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/712,818	11/12/2003	Mark R. Fernald	CC-0675	8840

7590 11/02/2006

EXAMINER
WASHBURN, DOUGLAS N

ART UNIT	PAPER NUMBER
2863	

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DATE MAILED: 11/02/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/712,818	FERNALD ET AL.	
	Examiner	Art Unit	
	Douglas N. Washburn	2863	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 October 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8 and 10-39* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8, 10, 11, 14-34 and 37* is/are rejected.

7)☒ Claim(s) *12,13,35,36,38 and 39* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 September 2005* is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *17 October 2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1 Applicant's arguments, see amendment, filed 2 October 2006, with respect to the rejections of claims 1-7, 11, 15-17, 23-31 and 34 under §102(b) and claims 8, 10, 14, 32, 33 and 37 under §103(a) have been fully considered and are persuasive. Therefore, the rejections have been withdrawn. However, upon further consideration, a new grounds of rejection is made in view of Gysling (US 2004/0069069).

The indicated allowability of claims 18-22 is withdrawn in view of the newly discovered reference to signals indicating vortical disturbance in a flow; a flow parameter is one of flow velocity and volumetric flow; a slope of a convective ridge determines velocity; volumetric flow rate determined in response to fluid velocity; and a processor cross-correlates signals to indicate fluid velocity. Rejections based on the newly cited reference follow.

Claim Rejections - 35 USC § 103

2 The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-7, 11, 15-31 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gysling(US 6,354,147) (Hereafter referred to as Gysling 4147) in view of Gysling (US 2004/0069069) (Hereafter referred to as Gysling 9069).

Gysling 4147 teaches:

At least two strain sensors (pressure sensors; column 5, lines 50-52) clamped (column 19, lines 17-21) onto the outer surface of a pipe (column 15, lines 60-65) at different axial locations along the pipe (column 5, lines 50-52; figure 1, elements X_1, X_2 and X_3), each of the pressure sensors providing a respective pressure signal indicative of a pressure disturbance within the pipe at a corresponding axial position (column 5, lines 54-57) in regard to claim 1;

A strap (strapping; column 19, lines 17-21) in regard to claims 1 and 26;

A signal processor (signal processor; column 2, lines 9 and 10; figure 1, element 60), responsive to said pressure signals, which provides a signal indicative of at least one parameter of a process flow flowing within a pipe (column 2, lines 9-11) in regard to claim 1;

The process flow is one of a single phase fluid and a multi-phase mixture (column 21, lines 6-10) in regard to claim 2;

A piezoelectric film sensor is attached to the outer surface of a strap (column 15, lines 60-65) in regard to claim in regard to claims 3 and 27;

A strap is a metallic material (column 19, lines 17-21) in regard to claims 4 and 28;

At least one of the strain sensors include an attachment device for securing the ends of the strap of the strain sensor to clamp the strain sensor onto a pipe (column 19, lines 17-21) in regard to claims 5 and 29;

The ends of at least one of the strain sensors are removably attached together to enable the removable and reattachment to a pipe (column 19, lines 17-21) in regard to claims 6 and 30;

The ends of at least one of the strain sensors are permanently attached together (column 19, lines 17-21) in regard to claims 7 and 31;

A piezoelectric film extends around a substantial portion of the circumference of a pipe (column 15, lines 37-41) in regard to claims 11 and 34;

Pressure signals are indication of acoustic pressures propagating within a pipe (column 5, lines 50-52) in regard to claim 15 and 23;

A parameter of a fluid is one of steam quality or "wetness", vapor/mass ratio, liquid/solid ratio, volumetric flow rate, mass flow rate, size of suspended particles, density, gas volume fraction, and enthalpy of a flow (column 2, lines 66 et seq; column 3, lines 1-9) in regard to claim 16;

A signal processor determines the slope of an acoustic ridge in the k-w plane to determine a parameter of the process flow flowing in the pipe (column 23, lines 5-23) in regard to claim 17;

Each sensor measures an acoustic pressure and provides a signal indicative of an acoustic noise within a pipe (column 15, lines 37-41) in regard to claim 23;

At least three pressure sensors (column 5, lines 50-52; figure 1, elements 14, 16 and 18) in regard to claim 24;

And strain sensors include pressure sensors (column 15, lines 60-65) in regard to claim 25.

Gysling 4147 is fails to fully teach:

A piezoelectric film material having a pair of conductors disposed on opposing surfaces thereof whereby the piezoelectric film is attached to the strap in regard to claims 1 and 26;

Piezoelectric film material includes at least one of polyvinylchlorine fluoride (PDVF), polymer film and flexible PZT in regard to claims 8 and 32;

Each of the pair of conductors is a coating of silver ink in regard to claims 10 and 33;

An electrical insulator between the piezoelectric film material and the strap in regard to claims 14 and 37;

Strain signals are indication of vortical disturbances within the fluid flow in regard to claim 18;

The parameter of the fluid is one of velocity of the process flow and the volumetric flow of the process fluid in regard to claim 19;

The signal processor determines the slope of a convective ridge in the k-ω plane to determine the velocity of the fluid flowing in the pipe in regard to claim 20;

The signal processor determines the volumetric flow rate of the fluid flowing in the pipe in response to the velocity of the fluid in regard to claim 21;

And the signal processor generates a flow velocity signal indicative of the velocity of the fluid flowing within the pipe by cross-correlating the strain signals in regard to claim 22.

Gysling 9069 teaches:

A strap (¶ 0085, line 4; figure 11, element 70), and piezoelectric film material having a pair of conductors disposed on opposing surfaces (¶ 0077, lines 3 and 4; figure 9) thereof whereby the piezoelectric film is attached to the strap (¶ 0056, lines 10-12) in regard to claims 1 and 26;

Piezoelectric film material includes at least one of polyvinylchlorine fluoride (PDVF), polymer film and flexible PZT (¶ 0075, lines 7-8) in regard to claims 8 and 32;

Each of the pair of conductors is a coating of silver ink (¶ 0077, line 4) in regard to claims 10 and 33;

Strain signals are indication of vortical disturbances within the fluid flow (¶ 0061, lines 4-8) in regard to claim 18;

The parameter of the fluid is one of velocity of the process flow and the volumetric flow of the process fluid (¶ 0185, lines 9-11) in regard to claim 19;

The signal processor determines the slope of a convective ridge in the k-ω plane to determine the velocity of the fluid flowing in the pipe (¶ 0202, lines 9-15) in regard to claim 20;

The signal processor determines the volumetric flow rate of the fluid flowing in the pipe in response to the velocity of the fluid (¶ 0185, lines 9-11) in regard to claim 21;

And the signal processor generates a flow velocity signal indicative of the velocity of the fluid flowing within the pipe by cross-correlating the strain signals (¶ 0182, lines 19-24) in regard to claim 22.

Regarding claims 1-8, 10, 11, 14-34 and 37, it would have been obvious to one skilled in the art at the time of the instant invention to modify the teaching of Gysling 4147 of strain sensors clamped onto the outer surface of a pipe at different axial locations along the pipe, each sensor providing a respective pressure signal indicative of a pressure disturbance within the pipe at a corresponding axial position with the teaching of Gysling 9069 of piezoelectric film material having a pair of conductors disposed on opposing surfaces because the piezoelectric material measures the strain induced within a pipe due to unsteady pressure variations (e.g., vortical and/or acoustical) within a process mixture.

Regarding claims 8 and 32, it would have been obvious to one skilled in the art at the time of the instant invention to modify the teaching of Gysling 4147 of a piezoelectric film material having a pair of conductors disposed on opposing surfaces and the piezoelectric film is attached to a strap with the teaching of Gysling 9069 of a piezoelectric film material includes at least one of polyvinylchlorine fluoride (PDVF), polymer film and flexible PZT because piezoelectric material or film generates an electrical signal proportional to the degree that the material is mechanically deformed or stressed.

Regarding claims 10 and 33, it would have been obvious to one skilled in the art at the time of the instant invention to modify the teaching of Gysling 4147 of strain sensors clamped onto the outer surface of a pipe at different axial locations along the pipe, each sensor providing a respective pressure signal indicative of a pressure disturbance within the pipe at a corresponding axial position with the teaching of Gysling 9069 of each of the pair of conductors is a coating of silver ink because for reasons of improved adhesion, it is advisable to use an ink containing nickel, silver or the like metal dispersed in an organic medium for the formation of the electrodes.

Regarding claim 18, it would have been obvious to one skilled in the art at the time of the instant invention to modify the teaching of Gysling 4147 of strain sensors clamped onto the outer surface of a pipe at different axial locations along the pipe, each sensor providing a respective pressure signal indicative of a pressure disturbance within the pipe at a corresponding axial position with the teaching of Gysling 9069 of strain signals are indication of vortical disturbances within the fluid flow because the velocity of vortical disturbances is related to the velocity of the mixture (*sic* in the pipe) and hence the volumetric flow rate may be determined.

Regarding claim 19, it would have been obvious to one skilled in the art at the time of the instant invention to modify the teaching of Gysling 4147 of strain sensors clamped onto the outer surface of a pipe at different axial locations along the pipe, each sensor providing a respective pressure signal indicative of a pressure disturbance within the pipe at a corresponding axial position with the teaching of Gysling 9069 of a parameter of the fluid is one of velocity of the process flow and the volumetric flow of the process fluid because convection velocity may then be calibrated to more precisely determine the mean velocity (*sic* of the process fluid).

Regarding claim 20, it would have been obvious to one skilled in the art at the time of the instant invention to modify the teaching of Gysling 4147 of strain sensors clamped onto the outer surface of a pipe at different axial locations along the pipe, each sensor providing a respective pressure signal indicative of a pressure disturbance within the pipe at a corresponding axial position with the teaching of Gysling 9069 of a signal processor determines the slope of a convective ridge in the k-ω plane to determine the velocity of the fluid flowing in the pipe because the spatial/temporal frequency content of time stationary sound fields are often displayed using k-ω plots.

Regarding claim 21, it would have been obvious to one skilled in the art at the time of the instant invention to modify the teaching of Gysling 4147 of strain sensors clamped onto the outer surface of a pipe at different axial locations along the pipe, each sensor providing a respective pressure signal indicative of a pressure disturbance within the pipe at a corresponding axial position with the teaching of Gysling 9069 of a signal processor determines the volumetric flow rate of the fluid flowing in the pipe in response to the velocity of the fluid because convection velocity may then be calibrated to more precisely determine the mean velocity (*sic* of the process fluid).

Regarding claim 22, it would have been obvious to one skilled in the art at the time of the instant invention to modify the teaching of Gysling 4147 of strain sensors clamped onto the outer surface of a pipe at different axial locations along the pipe, each sensor providing a respective pressure signal indicative of a pressure disturbance within the pipe at a corresponding axial position with the teaching of Gysling 9069 of a signal processor generates a flow velocity signal indicative of the velocity of the fluid flowing within the pipe by cross-correlating the strain signals because such vortical flow disturbances, as is known, are coherent dynamic conditions that can occur in the flow which substantially decay (by a predetermined amount) over a predetermined distance (or coherence length) and convect (or flow) at or near the average velocity of the fluid flow.

Claims 14 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gysling 4147 in view of Gysling 9069 and further in view of Krempl et al. (US 4,216,403) (Hereafter referred to as Krempl).

Gysling 4147 teaches:

At least two strain sensors (pressure sensors; column 5, lines 50-52) clamped (column 19, lines 17-21) onto the outer surface of a pipe (column 15, lines 60-65) at different axial locations along the pipe (column 5, lines 50-52; figure 1, elements X_1, X_2 and X_3), each of the pressure sensors providing a respective pressure signal indicative of a pressure disturbance within the pipe at a corresponding axial position (column 5, lines 54-57) in regard to claim 1;

A strap (strapping; column 19, lines 17-21) in regard to claims 1 and 26;

A signal processor (signal processor; column 2, lines 9 and 10; figure 1, element 60), responsive to said pressure signals, which provides a signal indicative of at least one parameter of a process flow flowing within a pipe (column 2, lines 9-11) in regard to claim 1;

The process flow is one of a single phase fluid and a multi-phase mixture (column 21, lines 6-10) in regard to claim 2;

A piezoelectric film sensor is attached to the outer surface of a strap (column 15, lines 60-65) in regard to claim in regard to claims 3 and 27;

A strap is a metallic material (column 19, lines 17-21) in regard to claims 4 and 28;

At least one of the strain sensors include an attachment device for securing the ends of the strap of the strain sensor to clamp the strain sensor onto a pipe (column 19, lines 17-21) in regard to claims 5 and 29;

The ends of at least one of the strain sensors are removably attached together to enable the removable and reattachment to a pipe (column 19, lines 17-21) in regard to claims 6 and 30;

The ends of at least one of the strain sensors are permanently attached together (column 19, lines 17-21) in regard to claims 7 and 31;

A piezoelectric film extends around a substantial portion of the circumference of a pipe (column 15, lines 37-41) in regard to claims 11 and 34;

Pressure signals are indication of acoustic pressures propagating within a pipe (column 5, lines 50-52) in regard to claim 15 and 23;

A parameter of a fluid is one of steam quality or "wetness", vapor/mass ratio, liquid/solid ratio, volumetric flow rate, mass flow rate, size of suspended particles, density, gas volume fraction, and enthalpy of a flow (column 2, lines 66 et seq; column 3, lines 1-9) in regard to claim 16;

A signal processor determines the slope of an acoustic ridge in the k-ω plane to determine a parameter of the process flow flowing in the pipe (column 23, lines 5-23) in regard to claim 17;

Each sensor measures an acoustic pressure and provides a signal indicative of an acoustic noise within a pipe (column 15, lines 37-41) in regard to claim 23;

At least three pressure sensors (column 5, lines 50-52; figure 1, elements 14, 16 and 18) in regard to claim 24;

And strain sensors include pressure sensors (column 15, lines 60-65) in regard to claim 25.

Gysling 4147 is fails to fully teach:

A piezoelectric film material having a pair of conductors disposed on opposing surfaces thereof whereby the piezoelectric film is attached to the strap in regard to claims 1 and 26;

Piezoelectric film material includes at least one of polyvinylchlorine fluoride (PDVF), polymer film and flexible PZT in regard to claims 8 and 32;

Each of the pair of conductors is a coating of silver ink in regard to claims 10 and 33;

An electrical insulator between the piezoelectric film material and the strap in regard to claims 14 and 37;

Strain signals are indication of vortical disturbances within the fluid flow in regard to claim 18;

The parameter of the fluid is one of velocity of the process flow and the volumetric flow of the process fluid in regard to claim 19;

The signal processor determines the slope of a convective ridge in the k-ω plane to determine the velocity of the fluid flowing in the pipe in regard to claim 20;

The signal processor determines the volumetric flow rate of the fluid flowing in the pipe in response to the velocity of the fluid in regard to claim 21;

And the signal processor generates a flow velocity signal indicative of the velocity of the fluid flowing within the pipe by cross-correlating the strain signals in regard to claim 22.

Gysling 9069 teaches:

A strap (¶ 0085, line 4; figure 11, element 70), and piezoelectric film material having a pair of conductors disposed on opposing surfaces (¶ 0077, lines 3 and 4; figure 9) thereof whereby the piezoelectric film is attached to the strap (¶ 0056, lines 10-12) in regard to claims 1 and 26;

Piezoelectric film material includes at least one of polyvinylchlorine fluoride (PDVF), polymer film and flexible PZT (¶ 0075, lines 7-8) in regard to claims 8 and 32;

Each of the pair of conductors is a coating of silver ink (¶ 0077, line 4) in regard to claims 10 and 33;

Strain signals are indication of vortical disturbances within the fluid flow (¶ 0061, lines 4-8) in regard to claim 18;

The parameter of the fluid is one of velocity of the process flow and the volumetric flow of the process fluid (¶ 0185, lines 9-11) in regard to claim 19;

The signal processor determines the slope of a convective ridge in the k-ω plane to determine the velocity of the fluid flowing in the pipe (¶ 0202, lines 9-15) in regard to claim 20;

The signal processor determines the volumetric flow rate of the fluid flowing in the pipe in response to the velocity of the fluid (¶ 0185, lines 9-11) in regard to claim 21;

And the signal processor generates a flow velocity signal indicative of the velocity of the fluid flowing within the pipe by cross-correlating the strain signals (¶ 0182, lines 19-24) in regard to claim 22.

Krempl teaches:

An electrical insulatorbetween the piezoelectric film material and the strap in regard to claims 14 and 37.

Regarding claims 14 and 37, it would have been obvious to one skilled in the art at the time of the instant invention to modify the teaching of Gysling 4147 of a piezoelectric film material having a pair of conductors disposed on opposing surfaces and the piezoelectric film is attached to a strap and Gysling 9069 of a piezoelectric film material having a pair of conductors disposed on opposing surfaces thereof whereby the piezoelectric film is attached to the strap with the teaching of Krempl of an electrical insulator between the piezoelectric film and the strap because the insulating tapes would have provided electrical isolation between the electrodes of sensor element and leader ends.

Allowable Subject Matter

3 Claims 12, 13, 35, 36, 38 and 39 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Reasons for indicating allowable subject matter were presented ion office action mailed 1 June 2006.

Conclusion

4 Any inquiry concerning this communication or earlier communications from the examiner should be directed to Douglas N. Washburn whose telephone number is (571) 272-2284. The examiner can normally be reached on Monday through Thursday 6:30 AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John E. Barlow can be reached on (571) 272-2269. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

MICHAEL NGHIEM
PRIMARY EXAMINER

DNW